



KRISHNA KANTA HANDIQUI STATE OPEN UNIVERSITY
Hiranya Kumar Bhuyan School of Science & Technology
Home Assignment
Bachelor of Arts (MATHEMATICS)
Abstract Algebra and Discrete Mathematics [GMAS2 01]
2nd Semester, 2020

Total Marks 50

Assignments are required to be written in your own language, copying in toto from the learning material will carry less score.

প্রদত্ত কৰ্ম নিজৰ ভাষাত লিখা বাঞ্ছনীয়। উত্তৰ লিখোতে বিশ্ববিদ্যালয়ৰ স্ব-শিক্ষণ সামগ্ৰী তথা লগৰ শিক্ষার্থীৰ পৰা হুবহু নকল নকৰিব, অন্যথা নম্বৰ কমাই দিয়া হ'ব।

1. Answer the following questions-

(2 X 4= 8)

প্রশ্ন নং ১ : তলৰ প্রশ্নবোৰৰ উত্তৰ উলিওৱাক :

a. Let ধৰাহ'ল $A = \{1, 2, 3\}$

$$R = \{(1, 1), (2, 2), (3, 3), (1, 2), (2, 3)\}$$

Show that R is reflexive but neither symmetric nor transitive.

দেখুৱাওক যে R প্রতিফলনীয়, কিন্তু সমমিত নহয়, সংক্রমকো নহয়।

b. Let S be a set having 4 elements. How many binary operations can be defined on S?

4 টা মৌলবিশিষ্ট এটা সংহতি। S অত কিমানটা দ্বৈত প্রক্রিয়া সংজ্ঞাবদ্ধ কৰিব পাৰি।

c. In how many way can we draw a king or a queen from a pack of cards ?

এবাহ তাচৰ পৰা এপাত চাহেব বা এপাত বিবি কিমান উপায়ে পাব পাৰি?

d. Give an example of a Boolean Algebra that has infinite number of elements.

অসীম মৌলবিশিষ্ট বুলীয় বীজগণিত এটাৰ উদাহৰণ দিয়ক।

2. Answer the following questions-

(3 X 4= 12)

প্রশ্ন নং ২ : তলৰ প্রশ্নবোৰৰ উত্তৰ উলিওৱাক :

a. Let ধৰাহ'ল $f : \mathbb{N} \times \mathbb{N} \rightarrow \mathbb{N}$, $f(a, b) = 3^a 4^b$, $(a, b) \in \mathbb{N} \times \mathbb{N}$

Examine if f is (i) one-one, (ii) onto.

f (i) একৈকী, (ii) আচ্ছাদক হয় নে নহয় পৰীক্ষা কৰক।

b. Prove that a ring R is commutative if and only if

প্রমাণ কৰক যে R ক্রমবিনিমেয় হ'ব যদি আৰু যদিহে

$$(a + b)^2 = a^2 + 2ab + b^2, \text{ for all } a, b \in R$$

c. Show that a group of prime order is simple.

দেখুওৱাক যে এটা সংখ্যাৰ মৌলৰ সংখ্যা মৌলিক সংখ্যা হ'লে সংখ্যাটো সৰল।

d. Let $(B, +, \cdot, /)$ be a Boolean Algebra, and let $a, b, c, d \in B$. Prove that

$$a \cdot c + b \cdot d = (a+b) \cdot (b+c) \cdot (c+d) \cdot (d+a)$$

ধৰা হ'ল $(b, +, \cdot, /)$ এটা বুলীয় বীজগণিত, আৰু a, b, c, d প্রমাণ কৰক যে

$$a \cdot c + b \cdot d = (a+b) \cdot (b+c) \cdot (c+d) \cdot (d+a)$$

3. Answer the following questions-

(5 X 2= 10)

প্রশ্ন নং ৩ : তলৰ প্রশ্নবোৰৰ উত্তৰ উলিওৱাক :

a. Prove, using combinational argument, that

$$C(2n, 2) = 2 C(n, 2) + n^2$$

মিশ্ৰিত যুক্তিৰ সহায়ত প্রমাণ কৰক যে

$$C(2n, 2) = 2 C(n, 2) + n^2$$

b. Let R be a commutative ring with unity and is without zero divisors. Show that the only idempotent elements are the zero element and the unity element.

ধৰা হ'ল R এটা শূন্য ভাজকবিহীন এককসহ ক্রমবিনিমেয় বলয়। দেখুৱাওক যে শূন্য মৌল আৰু একক মৌলই একমাত্র বৰ্ণসম মৌল।

4. Answer the following questions-

প্রশ্ন নং ৪ : তলৰ প্রশ্নবোৰৰ উত্তৰ উলিওৱাক :

(10 X 2= 20)

a. Let Z be the set of integers, We define $(+)$ and (\cdot) on Z as follows

Z অখণ্ড সংখ্যাৰ সংহতি। Z অত $(+)$ আৰু (\cdot) আৰু সংজ্ঞা এনেদৰে দিয়া আছে।

$$a (+) b = a + b - 1,$$

$$a (\cdot) b = a + b - ab, \text{ for all } a, b \in Z$$

Examine Z is a commutative ring with unity under $(+), (\cdot)$.

$(+)$ অৰ অধীনত (\cdot) এটা এককসহ ক্রমবিনিমেয় বলয় হয় নে নহয় পৰীক্ষা কৰক।

b. Consider the vector space $R^3(R)$ under componentwise addition and componentwise scalar multiplication.

Examine if the set $\{(1,2,1), (2,1,0), (1,-1,2)\}$ is a basis of $R^3(R)$.

ধৰা হ'ল মৌলক্রমিক যোগ আৰু মৌলক্রমিক স্কেলাৰ পূৰণৰ অধীনত $R^3(R)$ এটা ভেক্টৰ স্থান।

$\{(1,2,1), (2,1,0), (1,-1,2)\}$ সংহতিটো $R^3(R)$ অৰ আধাৰ হয়নে নহয় পৰীক্ষা কৰক।

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Assignment Guidelines

A. Guidelines to Co-ordinators:

1. Assignments are parts of teaching-learning process and compulsory.
2. The spirit behind this is to help learners to understand the subject and prepare themselves better for the term-end examination.
3. Assignment responses are to be evaluated and feedback are required to be communicated to the learners, by giving back the assignments with evaluators comments. Such assignments are to be collected at the time of issuing admit cards and be stored in the centre's office till the end of next semester.
4. Assignment marks are to be sent to the Controller of Examinations as soon as the

examination routines are published.

5. Keeping the above points in mind *Co-ordinators will fix the time/date of submission of assignments by the learners as may be convenient to follow the guidelines in true spirits.*

B. Guidelines to learners :

1. As soon as the SLMs are received the learners will write the assignments in their own handwriting (assignment questions may be downloaded from the website, if necessary) to be submitted to Co-ordinators as per the dates fixed for the purpose. Timely submission of assignments at the Study Centres will help in quick processing of results of respective learners. Otherwise this will create unnecessary delay in declaration of results.
2. Writing of assignment (work) and submission of the same in time is compulsory.

Registrar

N.B. The learners will have to collect receipt after submitting the assignment with the signature and seal of the collector of study centre and will have to keep with him/her till the declaration of result.

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Receipt :

Received the assignment from Mr/MsEnrollment
numberof **2nd semester (Mathematics) (2020)** on2020.

Date:

Signature of collector with seal

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